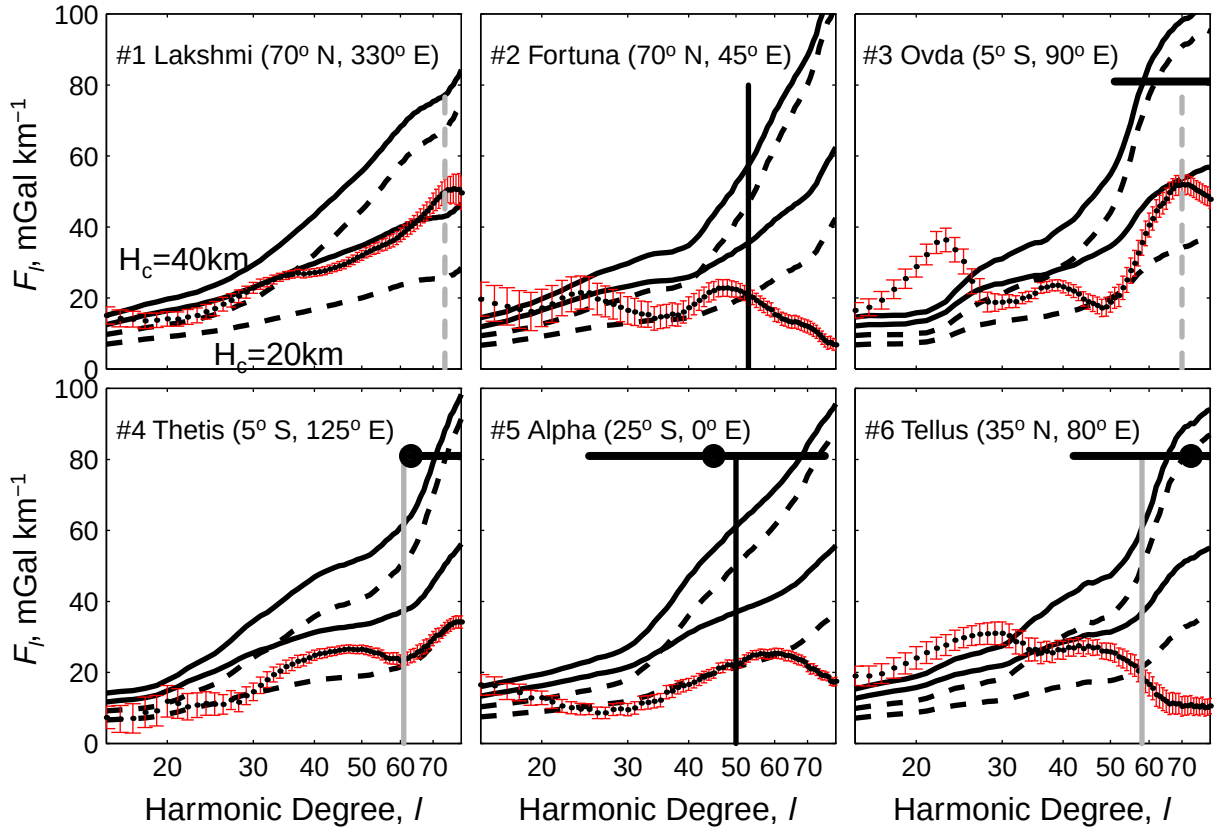
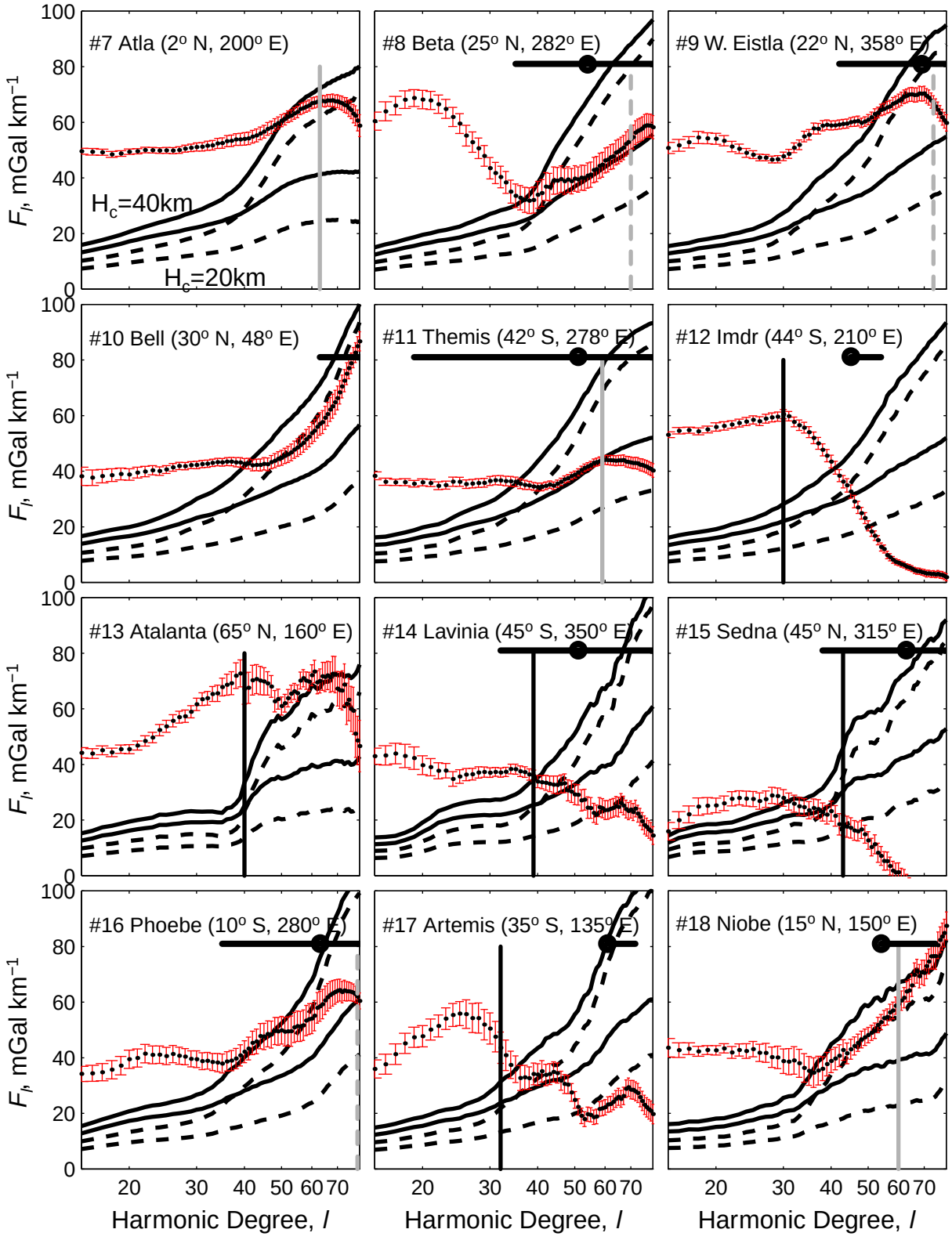
LOCALIZATION AND SPECTRAL RESOLUTION OF VENUS GRAVITY DATA: NEW CONSTRAINTS ON THE THICKNESS OF THE ELASTIC LITHOSPHERE. Mark Simons, *California Institute of Technology, Pasadena CA 91125, USA, simons@gps.caltech.edu*, Catherine L. Johnson, Sean C. Solomon, *Dept. of Terrestrial Magnetism, Carnegie Institution of Washington, Washington, D.C. 20015-1305, USA.*

On the basis of a spatio-spectral localization analysis of recent Venus gravity model mgnp120psaap [1], which extends to harmonic degree and order 120, we re-examine the relative roles of dynamic and lithospheric support of topography on Venus. Our method relies on the spectral analysis of spatially-windowed representations of the field [2]. Estimates of the spectrum of the gravity field in spatially restricted regions result in a maximum spectral resolution, L_{nyq}, which depends on, but is less than, the maximum degree of the field, L_{mod} [2]. Our actual values for L_{nyq} are based on empirical estimates of the position-dependent resolution. We also calculate the largest degree resolvable in the original line-of-sight orbital data, L_{dat}, using a multi-taper coherence approach [3]. Estimates of L_{nyq} for 18 regions are shown by the vertical lines in the panels below, with solid black, solid grey, and dashed gray lines indicating decreasing levels of confidence. Where estimates of L_{dat} are possible, they are indicated by a black dot and a horizontal 1-σ error bar. Estimates of L_{nyq} and L_{dat} agree reasonably well for most of the regions. Besides the resolution estimates, the panels below show the observed admittance spectra, F_l, as well as theoretical spectra from models of surface loading of an elastic plate with compensation at depths of 20 (dashed curve) and 40 km (solid curve) with effective elastic plate thicknesses, T_e, of 10 and 30 km (in order of increasing admittance). F_l estimates beyond L_{nyq} should be disregarded. As shown previously [2], the highland plateaus and tesserae (#1 through #6) are consistent with static compensation with $T_e < 20$ km. For the highland swells, plains, and lowlands (#7 through #18), we find a transition at $l \approx 40$ from flat F_l spectra, characteristic of convective support of topography, to increasing F_l with increasing l, consistent with elastic support [see also 4,5]. Where not limited by L_{nyq}, the admittance estimates indicate $T_e < 30$ km. Such estimates suggest a thermal lithosphere less than half the 300-km-thickness required by models of catastrophic lithospheric recycling on Venus [e.g., 6].

References: [1] A.S. Konopliv & W.L. Sjogren, in *Venus II*, in press, 1997; [2] M. Simons *et al.*,, *GJI*, submitted, 1996; [3] C.L. Johnson, *PhD. Thesis*, 1994; [4] S.E. Smrekar, *Icarus*, **112**, 2-26, 1994; [5] R.J. Phillips, *Icarus*, **112**, 147-170, 1994; [6] D.L. Turcotte, *JGR*, **99**, 17061-17068, 1993.




#7 Atla (2° N, 200° E)
#8 Beta (25° N, 282° E)
#9 W. Eistla (22° N, 358° E)
#10 Bell (30° N, 48° E)
#11 Themis (42° S, 278° E)
#12 Imdr (44° S, 210° E)
#13 Atalanta (65° N, 160° E)
#14 Lavinia (45° S, 350° E)
#15 Sedna (45° N, 315° E)
#16 Phoebe (10° S, 280° E)
#17 Artemis (35° S, 135° E)
#18 Niobe (15° N, 150° E)
H_c=40km
H_c=20km
F_l, mGal km^-1
Harmonic Degree, l
0
20
40
60
80
100
20
30
40
50
60
70